FPM LIBRARY

United States
Department of
Agriculture
**Forest
Service**
Southwestern
Region

Forest Pest Management Report

R-3 87-4

ANNUAL SOUTHWESTERN REGION PEST CONDITIONS REPORT 1986

April 1987

3450

R-3 87-4

ANNUAL SOUTHWESTERN REGION PEST CONDITIONS REPORT 1986

April 1987

Compiled by
T.J. Rogers and Helen Maffei

USDA Forest Service, Southwestern Region
State and Private Forestry
Forest Pest Management
517 Gold Avenue, SW
Albuquerque, New Mexico 87102

FOREST PEST MANAGEMENT STAFF

Douglas L. Parker, Director

Andrea Hendrix, Chief Clerk

Lou S. Trujillo, Clerk-Typist

Jerome S. Beatty, Assistant Director, Pathologist

Helen Maffei, Pathologist

Richard Norris, Pathology Biological Technician

Jesus A. Cota, Assistant Director, Pesticide-Use Mgt. & Coop.

James P. Linnane, Assistant Director, Entomology

Terrence J. Rogers, Entomologist

Dayle D. Bennett, Entomologist

John M. Chavez, Biological Technician

Trade names and commercial enterprises or products are mentioned solely for necessary information. No endorsement by the U.S. Department of Agriculture is implied.

CONTENTS

INSECT AND DISEASE CONDITIONS 1
Conditions in Brief 1
Status of Major Insect Pests 1
Pine engraver beetle 1
Mountain pine beetle 2
Western pine beetle 2
Spruce beetle 2
Western spruce budworm 2
Pandora moth 3
Status of Pest Complexes 3
Aspen defoliators 4
Douglas-fir mortality 4
True fir mortality 4
Status of Diseases 4
Dwarf mistletoes 4
Root diseases 5
Nursery diseases 5
Stem cankers and decay 5

FOREST PEST MANAGEMENT ACTIVITIES IN 1986 7
Detection Surveys 8
Evaluations 8
Entomology 8
Pathology 8
Suppression Projects 9
Integrated Forest Protection 9
The Integrated Forest Protection Concept 9

FOREST PEST CONDITIONS IN THE STATE OF ARIZONA 10

FOREST PEST CONDITIONS IN THE STATE OF NEW MEXICO 11

RECENT PUBLICATIONS 14

CONDITIONS IN BRIEF

Bark beetle-related ponderosa pine mortality increased throughout the Southwest in 1986. Ips beetles continued to be the primary cause of tree mortality followed by the mountain pine beetle and western pine beetle, respectively. In mixed conifer forests, the majority of the tree mortality detected was cause by the fir engraver and Douglas-fir beetle. Although spruce beetle activity continued to kill substantial numbers of trees in 1986, outbreaks in Arizona and New Mexico appear to be declining.

Western spruce budworm defoliation in the Southwest decreased from 632,124 acres in 1985 to 469,416 acres in 1986. In northern New Mexico, defoliation was widespread on the Carson and Santa Fe National Forests and adjacent lands of private ownership including the Taos and Picuris Pueblo Indian Reservations. Less extensive areas of defoliation occurred on the Cibola, Lincoln and Gila National Forests and the Mescalero-Apache Indian Reservation in central and southern New Mexico. In Arizona, defoliation was detected on portions of the Apache-Sitgreaves and Kaibab National Forests and Grand Canyon National Park.

Aspen defoliation in the Region increased nearly three-fold from 13,560 acres in 1985 to 40,190 acres in 1986. Most of the defoliation observed occurred on the Carson and Santa Fe National Forests, New Mexico, and resulted from a combination of insects and disease which included the large aspen tortrix, western tent caterpillar and Marssonina leaf spot disease. In Arizona, isolated areas of large aspen tortrix and western tent caterpillar defoliation were detected on the Apache-Sitgreaves and Kaibab National Forests, respectively. This defoliation caused little permanent tree damage.

The dwarf mistletoes are the most damaging agents of conifers in the Region: Annual losses are estimated at 25 million cubic feet in Arizona and New Mexico. In addition, heavily infected trees have been reported as hazards in campgrounds and other recreation areas.

Dwarf mistletoe surveys were done over 63,733 acres and control projects were conducted on a total of 4,255 acres of infected ponderosa pine.

Root and butt rots are another important cause of wood volume loss in the Southwestern Region. Hazard trees are also associated with root disease centers. Two root rotting agents are primarily responsible; Armillaria mellea and Fomes annosus. Damage from A. mellea infestation occurs primarily in ponderosa pine stands while damage from F. annosus infestation occurs primarily in mixed conifer and spruce fir stands.

STATUS OF MAJOR INSECT PESTS

Pine engraver beetles, Ips spp. Ips beetles continued to cause low levels of tree mortality throughout the Region in 1986. Concentrated group and widely scattered individual tree mortality totalling an estimated 2,435 acres were detected on the Cibola, Lincoln and Santa Fe National Forests in New Mexico and the Apache-Sitgreaves, Coconino, Prescott and Tonto National Forests and San Carlos and Fort Apache Indian Reservations in Arizona. The majority of the Ips-caused tree mortality observed occurred in areas recently disturbed by fire and/or logging activities.

Mountain pine beetle, Dendroctonus ponderosae. Ponderosa pine mortality resulting from mountain pine beetle attacks increased Regionwide from an estimated 968 acres in 1985 to 2,050 acres in 1986. Most of the increased mountain pine beetle activity detected occurred in northern New Mexico on the Carson National Forest and adjacent Taos Pueblo Indian lands. Mortality ranged from individual trees to concentrated groups of from 15 to over 200 trees. In Arizona, mountain pine beetle activity was relatively minor on the Kaibab National Forest and Grand Canyon National Park and consisted of widely scattered individual and small group (less than 10) tree mortality.

Western pine beetle, Dendroctonus brevicomis. Western pine beetle activity decreased throughout the Region again in 1986. Acreage exhibiting tree mortality decreased from 908 acres in 1985 to 350 acres in 1986 and mostly consisted of widely scattered individual tree mortality.

Spruce beetle, Dendroctonus rufipennis. Acreage exhibiting spruce mortality caused by the spruce beetle decreased from 11,000 acres in 1985 to 1,220 acres in 1986, a 9-fold decrease. In Arizona, tree mortality was highest within the Mount Baldy Wilderness Area on the Fort Apache Indian Reservation while on the adjacent Apache-Sitgreaves National Forests, mortality was relatively minor numbering fewer than 100 trees. In New Mexico, several concentrated groups of tree mortality were detected within the Pecos Wilderness Area and the Valle Vidal Administrative Unit on the Carson National Forest. Regionwide, these spruce beetle outbreaks appear to be on the decline.

Western spruce budworm, Choristoneura occidentalis. Western spruce budworm defoliation of Douglas-fir, true firs and spruce decreased Regionwide from an estimated 632,124 acres in 1985 to 469,416 acres in 1986 (Table 1 and Figure 1). In northern New Mexico, extensive areas of defoliation occurred on the Carson and Santa Fe National Forests and adjacent lands of mixed ownership, including the Taos and Picuris Pueblo Indian Reservations. Less extensive areas of defoliation were also detected on the Cibola, Lincoln, and Gila National Forests and Mescalero-Apache Indian Reservation, New Mexico. In Arizona, the western spruce budworm continued to defoliate portions of the Apache-Sitgreaves and Kaibab National Forests and Grand Canyon National Park. Conservative estimates place the annual volume loss attributed to budworm at 3 to 5 million cubic feet, principally in New Mexico.

Table 1--Acres of Western Spruce Budworm Defoliation, Southwestern Region, 1986

Land Ownership Class	Relative Defoliation (Acres) Light	Moderate	Heavy	Total
National Forest	341,620	93,680	4,196	439,496
Indian Lands	5,880	-	-	5,880
National Park Service	19,880	-	-	19,880
State and Private*	4,160	-	-	4,160
		Grand Total		469,416

*Intermingled State and private lands within National Forests.

Pandora moth, Coloradia pandora. During 1985, a new infestation (approximately 760 acres) was detected on the North Rim of the Grand Canyon National Park near Cape Royale. Since visible pandora moth defoliation occurs only every other year, no defoliation was observed in 1986. However, recent surveys indicated larval populations were sufficiently high to cause moderate to heavy defoliation during 1987. Area of defoliation is predicted to increase 2 or 3 times in size over the area detected in 1985.

Aspen defoliators: Large aspen tortrix, Choristoneura conflictana; western tent caterpillar, Malacosoma californicum.

In Arizona, isolated areas of large aspen tortrix defoliation and western tent caterpillar defoliation were detected on the Apache-Sitgreaves and Kaibab National Forests, respectively. Defoliation damages caused by these aspen defoliators were minor and of little significance.

Table 2—Status of Other Insects in Arizona and New Mexico 1986

Common Name	Scientific Name	Host	Locality	Remarks
Pinyon needle miner	Coleotechnites spp.	Pinyon pines	Cibola NF, NM	Isolated infestation
Sawflies	Neodiprion spp. and Zadiprion spp.	Ponderosa and Pinyon pines	Cibola NF, NM Gila NF, NM	Isolated occurrence; damage to plantation seedlings
			Apache-Sitgreaves NFs, AZ	Isolated occurrence
			Wapatki National Monument, AZ	Isolated occurrence
Aphids	Cinara spp.	Ponderosa pine	Apache-Sitgreaves NFs, AZ San Carlos IR, AZ	Isolated occurrence
Spittlebugs	Aphrophora spp. or Clastoptera spp.	Gambel Oak Junipers	Kaibab NF, AZ Cibola NF, NM	Numerous in infested oak stands; some branch & tree mortality of junipers
Alder flea beetle	Altica spp.	Alder	Tonto NF, AZ	Severe defoliation
Red turpentine beetle	Dendroctonus valens	Ponderosa pine	Apache-Sitgreaves NFs, NM	Isolated occurrence

STATUS OF PEST COMPLEXES

Widely scattered tree mortality and growth loss resulting from a complex of insects and diseases occurs annually throughout the forests of the Southwest. Although the mortality detected is often ascribed to bark beetle attacks, most trees were first weakened by such factors as drought, stand stagnation,

defoliation, fire, root diseases, dwarf mistletoe or poor site conditions. Any number or combination of these factors may act together. Several pest complexes currently causing tree mortality in the Southwest are as follows:

Aspen defoliators. Marssonina leaf spot disease, Marssonina populi, large aspen tortrix, Choristoneura conflictana; western tent caterpillar, Malacosoma californicum. Regionwide, aspen defoliation increased almost three-fold from 13,560 acres in 1985 to 40,190 acres in 1986. The majority of the defoliation detected occurred in aspen stands on the Carson and Santa Fe National Forests and resulted from a combination of causes including Marssonina leaf spot disease, as the primary causal agent and the large aspen tortrix, and western tent caterpillar as secondary agents.

Douglas-fir Mortality. The amount of Douglas-fir mortality aerially detected in the Region increased over 3-fold from 590 acres in 1985 to 1,940 acres in 1986. Most of the mortality detected occurred in northern New Mexico on the Carson National Forest and adjacent Taos Pueblo Indian Reservation in stands previously predisposed by several years of severe western spruce budworm defoliation. Elsewhere, throughout the Region, mortality was widely scattered and minor. Pests which are frequently involved in this mortality include the Douglas-fir beetle, Dendroctonus pseudotsugae, root diseases, and Douglas-fir dwarf mistletoe, Arceuthobium douglasii.

True fir Mortality. True fir mortality was widely scattered throughout the Region in 1986 and primarily occurred in small groups of 1-10 trees. The highest concentrations of fir mortality occurred again on the Carson and Santa Fe National Forests in New Mexico and the Coconino National Forest in Arizona. Root diseases are commonly associated with this mortality and may play an important role in predisposing these trees to bark beetle attack. The fir engraver beetle, Scolytus ventralis, is the primary bark beetle found attacking white fir, while the western balsam bark beetle, Dryocoetes confusus, is more commonly found attacking subalpine or corkbark fir.

In addition to these two pest complexes, other, less understood or documented pest complexes also exist in the Southwestern Region. Pest management strategies which take into account the ecological complexity of pest problems will produce longer lasting results.

STATUS OF DISEASES

Dwarf Mistletoes. The dwarf mistletoes (Arceuthobium spp.) are the most damaging agents of commercial timber throughout the Southwest. Over 2.2 of the 4.8 million total acres of commercial national forest land are currently infested. Estimates of annual growth loss range from 100 to 150 million board feet for Arizona and New Mexico. Three principle hosts and dwarf mistletoe species are involved; ponderosa pine, A. vaginatum subsp. cryptopodum; spruce, A. microcarpum; and, Douglas-fir, A. douglasii. A. vaginatum is responsible for the greatest losses.

Presupression surveys were conducted in 1986 on 63,733 acres of infested ponderosa pine stands on a total of 13 Ranger Districts in 6 National Forests. Data on the incidence and severity of mistletoe was obtained in the stands surveyed. This information, along with the growth and yield program RMYD2, aided in the evaluation and selection of silvicultural prescriptions for the stands.

The Region-wide mistletoe survey continued in 1986 to encompass the Cibola and Carson National Forests. Information pertaining to distribution, severity, and volume losses associated with A. vaginatum on these forests will be available in 1987. The survey will end in 1987 with the completion of the Gila and the Prescott National Forests.

Root Diseases. Root and butt rot pathogens are responsible for an approximate 10-percent reduction in yield Region-wide. Armillaria mellea accounts for most of the wood volume loss in conifers, especially ponderosa pine. Other root pathogens, including Fomes annosus, Phaeolus scheinitzii, and Inonotus tomentosus, are responsible for the remaining loss. Annual losses due to mortality from root rots range from 15-20 MMBF. If growth losses are included, loss estimates run as high as 45 MMBF.

Nursery Diseases. Seedbed fumigation with methyl bromide and cloropicrin continued to be evaluated at the Albuquerque Tree Nursery. Pre- and post fumigation surveys indicated that fumigation still effectively reduced the levels of Fusarium spp. in the soil, with a resultant increase in seedling survival.

Stem Cankers and Decay. Aspen stands in Arizona and New Mexico are attacked by a number of stem cankering fungi including: Ceratocystis fimbriata, Hypoxylon mammatum, Cenangium singulare (Encoelia pruinosa), Cytospora chrysosperma and Cryptosphareria populina. Canker fungi cause significant reductions in growth and vigor in mature aspen stands, as a result of tree mortality, top breakage, cull and degrading. In many of the Region's aspen stands, 30 percent or more of the stems are affected. In addition, aspen timber type suffers widespread losses to stem decay caused by the false tinder fungus, Phellinus tremulae. White trunk rot incidence is especially significant in mature aspen stands, and cull volumes may range as high as 50 to 60 percent of the total standing volume. As the aspen resource is developed in this Region, and aspen stands are more routinely subjected to timber management planning and commercial entries, it will be necessary to critically evaluate the impact of these diseases and develop management strategies for their control.

Table 3—Southwestern Region—Status of Diseases in Arizona and New Mexico, 1986

Disease	Host	Location	Remarks
STEM AND BRANCH DISEASES			
Dwarf mistletoes *Arceuthobium* spp.	Douglas-fir, Engelmann spruce, ponderosa pine	Arizona, New Mexico	Dwarf mistletoe infestation causes a significant decrease in wood volume yield on commercial forest lands. Approximately 46% (2.2 million acres) of the total commercial acreage (4.8 million acres) are infested. Losses in wood production may exceed 25 million cubic feet of commercial timber in New Mexico and Arizona. As a point of reference, the total estimated annual increment of commercial wood volume of host conifers is approximately 202 million cubic feet.

Table 3—Southwestern Region—Status of Diseases in Arizona and New Mexico, 1986—Continued

False timber fungus *Phellinus tremulae*	Aspen	Arizona, New Mexico	*Phellinus tremulae* is responsible for the most common cull and defect in aspen. This white trunk rot, widespread throughout the host type, causes significant losses, especially in mature stands. Cull volumes may equal as much as 60 percent of the total volume.
Fir broom rust *Melampsorella caryophyllacearum*	True firs	Arizona, New Mexico	Fir broom rust is widely distributed in subalpine, corkbark, and white firs, and causes occasional top breakage.
Indian paint fungus *Echinodontium tinctorium*	Spruce, true firs	Arizona, New Mexico	Indian paint fungus is scattered in mature and overmature stands of mixed conifers but causes insignificant losses.
Limb rust *Peridermium filamentosum*	Ponderosa pine	Arizona	Limb rust is found in mature and overmature ponderosa pine in scattered locations on the Fort Apache Indian Reservation, Arizona. The disease causes minor damage to infected trees and is mainly a concern when identifying seed trees in infected stands.
Comandra rust *Cronartium comandrae*	Mondell pine, ponderosa pine	Arizona	Comandra rust occurs in the Payson and Prescott areas in Arizona on exotic Mondell and the native ponderosa pines. Damage has been restricted to individual trees but the possibility exists for the disease to spread to nearby Christmas tree plantations.
Red ring rot *Phellinus pini*	Douglas-fir, ponderosa pine, spruce, true firs	Arizona New Mexico	*Phellinus pini* is indigenous to mature and overmature stands of pine and mixed conifers. Scattered in distribution; losses and damage are minimal in most stands. It has also been found on immature pine and mixed conifers in suppressed conditions.
Spruce broom rust *Chrysomyxa arctostaphyli*	Spruce	Arizona, New Mexico	Spruce broom rust is scattered throughout the host type but is of little commercial significance.
Stem cankers *Ceratocystis fimbriata* *Hypoxylon mammatum* *Cenangium singulare* *Cryptosphaeria populina*	Aspen	Arizona, New Mexico	Canker fungi caused significant reductions in the yield of mature aspen stands. Damage includes: Tree mortality from girdling cankers, top breakage, cull, and decay. In many stands, over 30% of the stems are infected with one or more of these stem canker fungi.

Table 3—Southwestern Region—Status of Diseases in Arizona and New Mexico, 1986—Continued

ROOT DISEASES			
Annosus root disease Heterobasidion annosum	Douglas-fir, ponderosa pine, spruce, true firs	Arizona, New Mexico	The Southwest loses an estimated 15 to 20 million board feet annually to root rot. Losses may be as high as 25 percent in some seriously infested stands.
Armillaria root disease Armillaria mellea	Douglas-fir, ponderosa pine, true firs	Arizona, New Mexico	Proportionately A. mellea accounts for 80 percent of the root disease damage in conifers and other root pathogens are responsible for the remaining 20 percent.
Inonotus tomentosus	Ponderosa pine, spruce	Arizona, New Mexico	
Red-brown butt rot Phaeolus schweinitzii	Douglas-fir, true firs	Arizona, New Mexico	
Ganoderma applanatum	Aspen	Arizona, New Mexico	Scattered throughout the host type, the fungus causes windthrow and standing cull.
Black stain root disease Ceratocystis wageneri	Pinyon pine, ponderosa pine	Arizona, New Mexico	Black stain root disease is scattered throughout the Southwest. Losses are insignificant in commercial timber.
FOLIAGE DISEASES			
Elytroderma disease Elytroderma deformans	Pinyon pine, ponderosa pine	Arizona, New Mexico	Elytroderma needle cast was widely distributed, but at low levels, on the Coconino and Kaibab NFs.
Marssonina leaf spot Marssonina populi	Aspen	New Mexico	Defoliation of aspen resulting from black leaf spot increased in 1986. Black leaf spot has been positively identified on the Santa Fe and Carson NFs, as the cause of extensive defoliation.
ABIOTIC & UNKNOWN	Ponderosa pine	New Mexico	Abiotic declines, possible associated with adverse changes in soil moisture status as a result of road building and other construction activities have been reported.
	Ponderosa pine	Arizona	An area of declining ponderosa pine has been observed on the Fort Apache Indian Reservation. The cause of this decline is unknown but may be some kind of root rot complex.

FOREST PEST MANAGEMENT ACTIVITIES IN 1986

Major activities of the Southwestern Region Forest Pest Management (FPM) Staff include detection, evaluation, and suppression of forest pests and technical assistance to forest land managers on all Federal lands in Arizona and New Mexico. In addition, FPM personnel cooperated with the States of Arizona and

New Mexico in carrying out forest pest management activities on State and private lands through the Cooperative Forest Pest Action Program.

Detection Surveys

Detecting and monitoring insect and disease outbreaks and infestations is a major responsibility of the FPM Staff. This is accomplished by systematic aerial surveys, ground examinations, and encouraging forest workers to report unusual and suspected insect and disease occurrences by means of field surveillance kits provided by FPM.

Aerial surveys were conducted from July through August over 9.1 million acres of coniferous forests in Arizona and New Mexico to determine the location and extent of damage caused by insects and/or diseases. Upon completion of the surveys, maps showing the location, relative intensity, and kinds of outbreaks were prepared and sent to the respective administrative units.

Ground examinations were made, when necessary, to confirm aerial detection observations, as well as in response to requests from land managers for detailed information or identification. State pest management specialists conducted ground surveys on State and private lands in Arizona and New Mexico.

A wide variety of insects and diseases were identified by the staff from surveillance reports sent by forest workers from across the Region. Such reports are important for the early detection of potential pest problems, and land managers and forest workers are encouraged to continue to be alert for, and prompt in, reporting any unusual insect and disease activity.

Evaluations

Another major responsibility of FPM is to evaluate forest pest problems and provide land managers with alternatives and recommendations for management through a variety of approaches. Biological evaluations were conducted in 1986.

Entomology

The following western spruce budworm evaluations were conducted: (1) Apache-Sitgreaves National Forests, Arizona; (2) Carson National Forest, New Mexico; (3) Lincoln National Forest and Mescalero Apache Indian Reservation, New Mexico; and (4) Santa Fe National Forest, New Mexico.

In addition to these western spruce budworm biological evaluations, an *Ips* bark beetle evaluation was conducted on the Amarillo Timber Sale Area, El Rito Ranger District, Carson National Forest.

Pathology

Biological evaluations conducted in 1986 were of the following: (1) Results of 1986 fumigation at the Albuquerque Tree Nursery, Cibola National Forest, New Mexico, (2) Underwood Dwarf Mistletoe Suppressive Project, Gila National Forest, New Mexico, (3) technical assistance trip to the Prescott National Forest, Mingus Mountain and Horse Thief Basin Recreation Areas, Prescott National Forest, Arizona, (4) incidence, severity, and growth losses associated with ponderosa pine dwarf mistletoe on the Santa Fe National Forest, New Mexico, and (5) incidence, severity, and growth losses associated with ponderosa pine dwarf mistletoe on the Lincoln National Forest, New Mexico.

Suppression Projects

Forest insect and disease pests occasionally increase to significant levels and cause unacceptable damages to forest resources. These pests must then be managed by employing a combination of silvicultural, mechanical, biological, and/or chemical suppression strategies.

In 1986, Forest Pest Management conducted or participated in the following suppression project: (1) Thinning, pruning, chipping, and/or removing infested trees to control dwarf mistletoe infestations on a total of 8,660 acres of National Forest lands as listed in Table 1:

Table 1--Dwarf Mistletoe Presuppression Surveys and Suppression Projects Conducted During 1986

National Forest	Ranger District	Acres	Survey	Suppression
Apache-Sitgreaves	Chevelon	3,820	x	
Coconino	Blue Ridge	160		x
	Blue Ridge	10,500	x	
	Flagstaff	8,375	x	
	Long Valley	8,000	x	
	Mormon Lake	8,000	x	
	Sedona	10		x
Gila	Reserve	984	x	
Kaibab	Chalender	2,880	x	
	North Kaibab	2,975		x
	North Kaibab	10		x
Santa Fe	Jemez	7,000	x	
	Jemez	1,100		x
Tonto	Payson	6,000	x	
	Pleasant Valley	6,000	x	

INTEGRATED FOREST PROTECTION

In January 1986, the Integrated Pest Management Working Group provided the Region with a series of recommendations pertaining to western spruce budworm management in a document entitled "The Path From Here." These recommendations largely stated the Region should adopt an Integrated Forest Protection approach to pest management. In June 1986, the Regional Forester responded to "The Path From Here" recommendations; accepting the Integrated Forest Protection concept.

The Integrated Forest Protection Concept

Integrated Forest Protection can be briefly described as a forest pest management system focusing on forest stands, and not exclusively on pest populations. It recognizes, in forest situations, there are pest complexes interacting within forest stands and certain pest management strategies should focus on these complexes rather than on individual pest organisms. Under an

Integrated Forest Protection system, planning, decisions, and actions are based on beneficial and detrimental pest effects on management goals and objectives and, again, not solely on pest populations. Integrated Forest Protection results in pest management concerns being incorporated in the overall forest management process.

Integrated Forest Protection is derived from Integrated Pest Management, a widely accepted and utilized pest management concept. Integrated Pest Management was incorporated into NFMA regulations, as law, and has been Forest Service policy for some time. Integrated Forest Protection takes Integrated Pest Management a step further by incorporating the concept into the forest management process. In essence, Integrated Forest Protection is a more complex process involving the multi-habitat and multi-resource aspects of forest management.

FOREST PEST CONDITIONS REPORTED BY THE STATE OF ARIZONA

by

Robert Celaya[1]

Pine engraver beetles, Ips spp., caused widespread mortality of ponderosa and pinyon pines in Payson, Prescott and Show Low-Lakeside-Pinetop. It was unusual to see the beetles attacking both species of pine in the same area. The damage caused by these insects resulted in the adoption of an amendment to Payson's Tree Protection Ordinance which specifically addresses the removal of infested, infected or hazardous trees. These beetles are expected to cause additional tree losses in 1987, and other affected communities in the State should implement this tree removal practice.

Aspen leaf rust, Melampsora medusae, was identified in September north of Flagstaff and in Greer and Alpine. Widespread infections of this foliage disease are rare and require the right combination of mild temperatures and moist weather. These conditions were present in these areas in August and September triggering the rust outbreak. The primary effect on aspens is premature defoliation with accompanying vigor loss.

Comandra blister rust, Cronartium comandrae, was identified on Eldarica pines in several new locations in 1986. The outbreak which was first noted in the Chapel Hills area of Sedona in 1984 spread into West Sedona. Two new sites were also identified near Prescott: Chino Valley and Mayer, Arizona. The new locations near Payson include East Verde Park, Diamond Point Estates and Whispering Pines subdivision. In August, an infected pine was found in Payson. An additional infected pine was also noted in May. The rust will continue to spread in areas where the alternate host, bastard toadflax, is present.

Dwarf mistletoe, Arceuthobium spp., is undoubtedly the principal forest pest in the state. It is found in the Hualapai Mountains near Kingman, in the Prescott area, Sedona, Flagstaff, Strawberry-Pine, Heber-Overgaard, Linden, Show Low-Lakeside-Pinetop, Greer and Alpine. Efforts to treat this parasite in these areas have been piecemeal and a coordinated effort is needed. Efforts to develop a community-wide treatment project are planned for 1987.

---

[1]Forest Entomologist with the Division of Forestry, Arizona State Land Department.

Damage to trees caused by urbanization, has been an area of increasing concern over the past years. Information and assistance has been provided to various development projects near Flagstaff in order to minimize this damage. Efforts to encourage forested communities in the state to adopt tree protection ordinances and hire city foresters will continue in 1987.

FOREST PEST CONDITIONS REPORTED BY THE STATE OF NEW MEXICO

by

Tony Smith[2]

Western spruce budworm, Choristoneura occidentalis. Western spruce budworm decreased in incidence and intensity on State and private lands. A total of 26,600 acres of visible defoliation were recorded in the 1986 surveys. A definite downward trend in population levels was detected by ground and egg mass surveys. Defoliation by budworm is predicted to decrease or remain static in 1987. Acres of defoliation by ownerships/areas, as corrected from 1985 aerial survey by 1986 ground surveys are depicted in Table 1:

Table 1--Results of 1985-1986 Aerial and Ground Surveys for Western Spruce Budworm

	Light	Moderate	Heavy	Total Acres
Moreno Ranch	1,200	-	-	1,200
Angel Fire	400	-	-	400
Baldy Mountain	2,000	3,500	1,300	6,800
Philmont Scout Ranch[a]	6,000	3,000	3,000	12,000
Baca Location[b]	-	-	-	-
Rio Costillo	2,500	450	-	2,950
Sargent Wildlife Refuge	1,300	-	-	1,300
Chama Land & Cattle Co.	300	-	-	300
Tierra Amarilla Ski Area	1,100	-	-	1,100
Brazos Homeowners Association	400	150	-	550
Subtotal	15,200	7,100	4,300	
Total				26,600

[a] A portion of the decrease in defoliation on the Philmont is due to approximately 1,300 acres of white fir mortality as a result of red belt being subtracted from the previous heavy defoliation of 1985. The mortality was due to red belt.

[b] 18,322 acres of light defoliation and 400 acres of moderate defoliation were recorded in 1985. No ground survey was accomplished on the Baca Location No. 1 in 1986. However, Forestry Division district personnel report decreases in extent and severity of budworm defoliation.

Egg mass surveys indicate that defoliation in 1987 will be light to moderate in most entomological units. Moderate defoliation is predicted to occur on the Rio Costillo, Sargent Wildlife Refuge, and on the Tierra Amarilla Ski Area. No egg mass data were obtained from the Baldy Mountain area near Red River.

---

[2] Forest Entomologist with the New Mexico Department of Agriculture.

The Angel Fire property, sprayed with Dipel 8L in 1985, showed fewer than 400 acres of extremely light defoliation in 1986.

Western tent caterpillar, Malacosoma californicum and the large aspen tortrix, Choristoneura conflictana. These two insects continued to defoliate aspen in northern New Mexico but over greatly reduced acreages compared to those reported in 1985. Tent caterpillars showed significant infection by a Nucleo-polyhedrosis virus on the Tierra Amarilla Grant in 1985. Ground surveys in 1986 indicate a complete population collapse of the tent caterpillar infestation. The large aspen tortrix infesting private lands adjacent to the west half of the Carson National Forest has also been reduced greatly with fewer than 200 acres of light defoliation detected in ground surveys.

Douglas-fir tussock moth, Orgyia pseudotsugata. The chronic infestation of ornamental spruce, true firs, and Douglas-fir continued in Santa Fe for the 21st year. Tussock moth was also reported attacking a few ornamental spruce near Ruidoso and an infestation of ornamental spruce and white fir was detected near Cedar Crest. The Cedar Crest infestation will be sprayed with carbaryl from ground rigs in 1987, and pheromone traps will be placed in selected areas.

Pinyon needle miner Coleotechnites edulicola. A large outbreak of this insect continued in 1986, but over reduced acreages. The infestation, reported in excess of 30,000 acres in 1985, has declined to approximately 12,000 acres. All size classes are affected, and it is predicted that 5,000 acres of pinyon will be moderately to heavily defoliated. This infestation originated from a much smaller area near Tres Piedras, where defoliation over the past 8 years has produced branch, limb, and some tree mortality. Ips engraver beetles were expected to attack these weakened trees, but no infestations were detected in 1986.

An oak defoliator, family Tortricidae, species unknown. The original infestation of gambel oak by this insect defoliated in excess of 44,000 acres in 1983. Subsequent population decline over the past 3 years has led to a complete population collapse. No defoliation was detected in any of the previously infested areas in 1986.

Gypsy moth, Lymantria dispar. The New Mexico Department of Agriculture has cooperated with APHIS for the past 10 years in placing pheromone traps in areas likely to become infested with this insect. All life stages may be transported by motor vehicles, but most commonly the pupae and egg masses are the cause of spread. A single moth was captured in Roswell in 1984, but none were trapped in either 1985 or 1986. The pheromone survey will continue in 1987.

European elm scale, Gossyparia spuria. Most of the American elms in Albuquerque, Socorro, Santa Fe, Las Vegas, and Raton are heavily infested with this scale and some Lecanium sp. scales. These sucking insects have caused considerable damage to the trees in the form of branch and limb mortality, creating ideal breeding habitat for Scolytus multistriatus, the smaller European bark beetle. This beetle is responsible for the spread of Dutch elm disease, but to date, the disease has not been detected in New Mexico, although the beetle has been caught in pheromone traps in these cities.

Mountain pine beetle, Dendroctonus ponderosae. Attacks by this beetle occurred in somewhat isolated areas along York Canyon (Kaiser Steel Property), Cerrososo Canyon (Vermejo Property), and on the west side of the Moreno Ranch. "Hot spots" of 6 to over 100 trees were detected in early spring. July survey

indicated that egg deposition and subsequent brood development was extremely poor. Survey of the affected areas was accomplished in October and no green tree attacks were noted. Infested spots on the Kaiser Steel Property were salvage logged for mine props and timbers. Many of the spots on the Moreno Ranch were cut and removed for fuel wood.

Engraver beetles, Ips spp. Various species of engraver beetles continue to cause problems for private landowners building homes and recreational cabins in pinyon-juniper woodlands and ponderosa pine sites. Trees injured during home site preparation, road building, and home construction are most often attacked. 63 requests for advice and technical assistance were recorded in 1986. Typically 5 to 15 trees become infested during and subsequent to human perturbations. Infested firewood also creates problems around established homes and cabins regardless of site. Covering firewood with clear plastic is recommended and 2% carbaryl spray is an excellent preventative for high value ornamentals.

Ink spot disease, Ciborinia whetzelii and Marssonina leaf spot, Marssonina populi. These two foliage diseases caused extensive damage to aspen and premature defoliation in some areas. At least 1,000 acres of aspen were affected west of the Carson National Forest on private lands near Chama. An additional 1,600 acres of infected aspen patches were detected on the Philmont, Moreno Valley, C.S. Ranch, and adjacent private properties. These diseases usually follow after warm, wet weather conditions and are not usually a serious problem.

Unidentified pinyon needle disease. This unknown needle disease was first detected in early spring along the "Comanche Rim" country and along U.S. 285. Several thousand acres are infected from Cerro Molino Mt. north to Tres Piedras and approximately 1,200 additional acres of infected pinyon pines were detected on the El Rito District. Samples taken failed to produce fruiting structures and forest pathologists were unable to identify the fungus. The situation will be monitored carefully in 1987.

RECENT PUBLICATIONS

Hessburg, Paul F., and Beatty, Jerome S. 1986. Incidence, severity, and growth losses associated with ponderosa pine dwarf mistletoe on the Apache-Sitgreaves National Forests, R-3 86-5. 32 p.

Hessburg, Paul F., and Beatty, Jerome S. 1986. Incidence, severity, and growth losses associated with ponderosa pine dwarf mistletoe on the Santa Fe National Forest, R-3 86-6. 29 p.

Rogers, T.J. 1986. Biological evaluation, western spruce budworm, Carson National Forest, New Mexico, USDA Forest Service, Southwestern Region, R-3 87-3. 19 p.

Owen, Donald R. 1986. Annual Southwestern Region Pest Conditions Report, USDA Forest Service, Southwestern Region, R-3 86-4. 17 p.

Rogers, T.J. 1986. Suppression of western spruce budworm infestations in high-use recreational campgrounds with Bacillus thuringiensis, and Acecap, 97, systemic tree implants, Carson National Forest, New Mexico, USDA Forest Service, R-3 87-1. 12 p.